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ABSTRACT

Adolescents' developing sense of competence is based on two domains, ability and intelligence. Intelligence testing generally presumes a conception of ability as current capacity that limits the extent to which effort can improve performance. Conceptions of intelligence, and other skills, involve implications about the nature of different forms of abilities. The products of acculturation are involved in the conception of intelligence. To assess conceptions of ability, students were asked to interpret a performance situation in which two people applying differing amounts of effort earned the same score. Results indicated the attainment of an adult-like conception of ability is accomplished during early adolescence, whereas adult-like conceptions of intelligence are established toward the end of adolescence. Impaired performance is likely in early adolescence when students feel likely to fail, feel incompetent, and believe ability is the same as capacity. When older adolescents and undergraduates were interviewed, three levels of intelligence affecting performance were recognized: (1) difficulty of the skills; (2) effortful acquisition of information; and (3) problem solving or creative ability. Verbal ability corresponded with crystallized intelligence and nonverbal ability with fluid intelligence. The value placed on these abilities and students' perceptions of their competence affects self-esteem. A two-page list of references is included. (GDC)

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Adolescents' Conceptions of Ability and Intelligence

ED273661

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A sense of competence is one of the fundamental personal needs (Allport, 1961; White, 1973). Furthermore, at least in the view of Rawls (1971), a fundamental requirement of a just society is that all its members should be able to gain a sense of competence and esteem by developing their abilities as fully as possible. If, then, there are important changes in the meaning of competence at any point in the life span, these changes should have far-reaching implications for personal functioning and for our chances of a just society.

It is my contention that such important changes in the meaning of competence occur during adolescence. Traditional psychometic and experimental methods are poorly adapted to the detection of changes in the meanings of concepts. We have, instead, used Piaget's method of critical exploration. This method requires that investigators start with some notion of what they are looking for but that their methods should enable the discovery of meanings that they could not have anticipated. A fundamental notion we started with was that one should distinguish at least two domains of meaning related to the topic of competence--the domains of ability and intelligence.

This distinction can be illustrated with reference to psychometric research on intelligence. Satisfactory intelligence test administration requires optimum student motivation during testing and an individual's test score is interpreted as high or low with reference to the scores of others. These practices presume a <u>conception of ability</u> as current capacity that limits the extent to which effort can improve a person's performance relative to that of others. This is a conception that concerns the dynamics of performance rather than the long-term acquisition of skills. That is, it is a conception that is relevant to performance in test situations. It is also a conception that is relevant to the assessment of all manner of abilities;

intellectual, physical, and musical abilities for example. In this sense this conception is a general one. The other side of this fact is that this conception of ability involves no implications about the nature of different forms of abilities. This is the domain encompassed by conceptions of intelligence (and of physical and other skills). Psychometric researchers on intelligence do not normally dispute any matters I have referred to concerning conceptions of ability. They assume, for example, that optimum effort is necessary if one is to make a valid assessment of any type of intellectual ability. The points which these researchers have disputed concern matters such as the nature, origins, and changeability of intellectual abilities. Sould one, for example, distinguish the products of acculturation from abstract reasoning abilities? It is such issues that are here encompassed by the term conceptions of intelligence.

In keeping with this distinction between ability and intelligence, we have assessed students' conceptions of ability by, for example, asking them to interpret a performance (rather than a learning) situation in which two individuals who apply different amounts of effort earn the same score. In this instance, questions about the nature of the particular skill involved are not addressed. In studying students' conceptions of intelligence, on the other hand, our method involves the examination of their views about the nature of the skills demanded by different intellectual tasks and about whether and how these different skills might be improved.

It turns out that the attainment of an adult-like conception of ability is an accomplishment of early adolescence whereas adult-like conceptions of intelligence are established nearer the end of adolescence.

Early Adolescence: The Conception of Ability as Capacity

The commonly accepted understandings about intelligence test

administration that I have referred to in connection with the conception of ability are (in our society) an achievement of early adolescence. The nature of this achievement is perhaps best shown by a couple of interviews, the first of a student--typical of 12-year-olds--who had attained this understanding and the second of a student--typical of 8-year-olds--who had not. These two students were questioned about two students (depicted in a series of photographs) who scored the same despite unequal effort on a class assignment (Miller, 1985; Nicholls, 1978).

"Is one [of these two students who scored the same but differed in effort] smarter at these puzzles or are they the same?"

"This [lazier] one is smarter."

"How can you tell?"

"She looked around [was inattentive] but got the same number right."

"How come they both got the same score when one worked hard and one didn't work hard?"

"This [lazier] one was smarter."

"What would happen if they both worked hard? Would one get more or would they both get the same?"

"This one [lazier] would get more."

"How can you tell?"

"The other one already tried hard."

"So do you think one of them is smarter?"

"Her [the lazier student]."

This is a clear example of complete differentiation of the concepts of effort and ability (see level 4 of Table 1). To an adult there is nothing surprising about this interview excerpt. But this students' understanding is a dramatic accomplishment when compared to that of the following student who

has not fully differentiated the concept of ability from the concepts of effort and outcome.

"Is one of them smarter...?"

"This one [the harder worker] is."

"How can you tell?"

"He's doing his work."

"How come they both got the same score when this one worked hard and this one didn't work hard?"

"He [the lazy one] copied."

"Well, yes, that sometimes happens, but we didn't want to show you anyone who copies and this boy doesn't do that."

"He [the lazy one] must have thought about it."

"What would happen if they both worked really hard? Would one get more or would they both get the same?"

"The same."

"How can you tell?"

"If they both work hard and they are good workers they can get it done."

"So do you think one of them is smarter?"

"They are the same."

"How can you tell?"

"Both are smart because they both got their work done and they both got eight right."

This student expected equal effort to lead to equal results. And, where scores were equal he tried to account for this in terms of equal effort--by suggesting that the boy who was lazy actually thought about the work. This student differentiates effort as a cause from outcomes, but does not differentiate ability from effort and outcomes. This illustrates level 2 of

Table 1.[1]

If the conception of ability as capacity involves the significant change in the meaning of ability that these two interviews suggest it does, one would expect accompanying changes in affect or evaluations concerning effort and ability and in students' behavior when their perceived ability is at stake.

With regard to evaluations, students who had partially (Level 3) or completely (Level 4, Table 1) mastered the conception of ability as capacity did not expect teachers to show approval of someone described as having done well in school through high ability but with little effort (Nicholls, 1978). Less "mature" students expected teachers to approve of such students. This suggests that the evaluative significance of words connoting effort and ability change as the meaning of these concepts changes. Furthermore, when asked whether they would rather be like one or the other of two children who were shown as scoring equally on some school work despite unequal effort, children without the conception of ability as capacity overwhelmingly chose the harder worker. Of those who construed ability as capacity, on the other hand, only about one third made this choice (Nicholls, Patashnick, & Mettetal, 1986). At all grades, children believe that lack of effort leads to little learning and elicits the disapproval of teachers. But only those with the conception of ability as capacity see clear advantages in being able to do as well as others with less effort.

When ability is construed as capacity, effort as such is not only seen as relatively less valuable; it is also seen as less likely to stretch the limits of what we can do. In short, when it is construed as capacity, ability is seen as a more valued and fundamental personal quality and as placing firmer limits on what we can accomplish. This means that the belief that one lacks ability (or is about to be revealed as lacking in ability) should be more

devastating for students who construe ability as capacity than for those who do not. These contentions are supported by Miller's (1985) findings. He found performance to be more impaired in those 6th graders who had partially (Level 3) or completely (Level 4) attained the conception of ability as capacity than in those at lower levels of understanding of ability. This impairment occurred only in a context that was calculated to make students think they were about to discover that they lacked ability. It did not occur if there was no reason to expect failure or when an expected failure could readily be attributed to the unreasonable difficulty of the task. That is, impaired performance is more likely when students face a clear prospect of establishing that they are incompetent and when they construe ability as capacity. In summary, the early adolescent attainment of the conception of ability as capacity seems to have significant consequences for personal functioning.

Late Adolescence: Fluid and Crystallized Intelligence

Our (Nicholls, Patashnick, & Mettetal, 1986) starting point for the study of conceptions of intelligence was Sternberg, Conway, Ketron, and Bernstein's (1981) evidence that the first two factors in the conceptions of intelligence of both expert and lay North American adults correspond rather well to the concepts of fluid and crystallized intelligence. According to Horn (1968), "a relatively large proportion of the reliable variance in fluid intelligence reflects a pattern of physiological influences and a relatively small proportion of this variance reflects acculturation, whereas the opposite emphasis occurs for crystallized intelligence" (pp. 247-248).

We interviewed school children and college students about two students, one of whom was represented as more able than their classmates on a verbal test that exemplified crystallized intelligence and less able on the

non-verbal test that exemplified fluid intelligence. The second students' standing on these tests was reversed. The following extract from the transcript of an interview with a 16-year-old illustrates our finding that conceptions closely akin to fluid and crystallized intelligence began to prevail at about this age. (The full schedule of questions used is given in Nicholls et al., 1986.)

"What if these two children wanted to be near the top of their class on both tests. Could they both get better at the one they are bad at?"

"Yes."

"Would it be easier for one of them to get better?"

"Be easier for the one who is low on words." (Students referred to the verbal test as "words" and the non-verbal test as "shapes.")

"How can you tell?"

"The words are just memorizing. Shapes is more judgment. It's not memory so it'd be harder. You could get better [at shapes] but it still would be tough to do."

"...What if a new student comes to your class and the teacher could use only one test to see how intelligent or clever they are. Would one test be better for this?"

"Shapes show judgment, common sense. Words show what they've been taught. Shapes would be better if you wanted to not be biased by the person's background. If they are high on this, they have ability if they want to use it."

"Do you think one of these children is smarter or more intelligent than the other one?"

"Yes and no. More judgment is shown on shapes...[but] they are both intelligent in different ways."

Most undergraduates gave similar responses. For example: "There really aren't specific things to learn [for the shapes test]. In that way, it's more reasoning [than words] and it's harder to teach reasoning than facts" and "the words test is more or less memorization. For the shapes you have to analyse. [The person who is good on shapes] is more analytical."

These excerpts illustrate the most differentiated of the three levels of conception of verbal and abstract (non-verbal) intelligence that we isolated. (Level 3a, Table 2.) The essence of this conception is that accumulated information, or the contents of memory are distinguished from reasoning, problem solving, or (as a few students put it) creativity.

The distinguishing feature of the second (middle) level is the absence of this distinction and a construal of intellectual abilities in terms of the amount of information they involve. Extracts from three interviews illustrate this position: "Shapes are easier [to improve on]. All you have to do is look at them.... The words test tells more of what you know. The other is just shapes." And, "[You could improve] on shapes faster. You've got to put just shapes together. Not [like] words that you sometimes can't pronounce. You mightn't know the words.... [It would be easier to teach someone how to do shapes because] the teacher could tell them to just look at the outside texture [of the shapes] and then go to the inside." Again, "Shapes are easier [to improve on]. For words you have to remember the long word and the definition....You just have to look at the shapes."

We found that different conceptions of ability were accompanied by different evaluative judgments. We expected a similar pattern with conceptions of intelligence. Therefore, at the end of the interview about intelligence, students were asked whether they would rather be good at the verbal or the abstract test. Overall, 67 percent of the students with

conceptions akin to fluid and crystallized intelligence (Level 3b) preferred abstract intelligence whereas only 16 percent of those with subjective difficulty (Level 1) and information acquisition (Level 2) conceptions did (Nicholls, et al., 1986).

Personal and Social Consequences

The development, in early adolescence, of the conception of ability as capacity seems a significant landmark in personal growth. The world is always full of tasks we cannot master. Yet this does not occasion feelings of incompetence. It is being unable to do something that others can do or, when ability is construed as capacity, needing more effort than others for an equal accomplishment that makes us feel incompetent. The attainment of the conception of ability as capacity means that even those tasks we can master as well as others might, if we expect others to need less effort, offer us no prospect of a sense of competence. Furthermore, if we doubt our ability, we can face the prospect that the harder we try to avert a low performance, the more convincingly will a low performance establish our incompetence. Even if we do not face failure, effort as such is, now, less inherently valuable. Hard work still means virtue but it no longer connotes competence as it did in earlier conceptions of ability and effort. And, if we doubt our competence we will--when we construe ability as capacity--have less faith in the power of effort to raise our performance relative to that of others. All this adds up to the conclusion that, if we feel incompetent, even the real prospect of being able to learn something will not offer a sense of accomplishment or competence. Our best will be seen as not good enough and this will be experienced as a more fundamental personal inadequacy than it was before we developed the conception of ability as capacity. This should make for a stronger desire to escape from situations where we might reveal our

incompetence and lead to poorer performance when escape is not possible.

Our society makes it difficult for students to escape from school during early adolescence. But they have ample opportunity to drop out of the many voluntary sports organizations found in our society. And, students leave these organizations in droves at about the age when the conception of ability as capacity develops (Roberts, 1984). This drop-out is all the more dramatic when considered in the light of the fact that, especially for male adolescents, the ability to succeed is, on the average, more valued in sport than in other domains (Coleman, 1961; Roberts, 1984). Thus, the withdrawal from voluntary sport organizations that occurs in early adolescence can hardly be attributed to a lack of interest in competence at sport. In schoolwork, withdrawal must take more subtle forms--presumably a greater fatalism on the part of those who doubt their competence about the prospect of low status in the academic hierarchy and, beyond that, in the hierarchy of the workplace.

A large, complex, competitive society requires that individuals should be prepared to either give up or persist (at, for example, trying to become an engineer) on the basis of abstract information about their probable standing relative to the members of an unseen reference group. And students' effort and performance is more likely to reflect such information when they have attained the conception of ability as capacity (Miller, 1985). Such a society would, however, be brought to its knees if most students exhibited a dramatic loss of motivation to learn before they had acquired the numerical and verbal skills necessary for even low status jobs. The undifferentiated conceptions of ability that predominate through the grade-school years seem calculated to maintain the necessary level of industry, even on the part of students with doubts about their competence. The fact that the conception of ability as capacity emerges at an age when most students have attained basic literacy and

numerical skills suggests the presence of a divine plan to maintain and reproduce the social order of the modern industrial and technological societies. A society that reproduces itself by selectively robbing certain of its members of a sense of competence is inherently unjust. And, from the point of view of the individuals who doubt their competence (at sport or schoolwork), not just civilization, but development within civilization has its discontents. For, these students, it seems that early adolescence must produce a need to seek alternative sources of esteem and interpretations of education that resist the conventional thesis that it offers the way to success (Willis, 1977).

The development, in late adolescence, of the conceptions that resemble fluid and crystallized intelligence seems calculated to amplify and qualify the trends that are sustained by the development of the concept of ability as capacity. The greater preference for abstract reasoning ability on the part of students with the conceptions resembling fluid and crystallized intelligence raises the possibility that the prestige accorded disciplines that appear to demand abstract intelligence (e.g., mathematics) might depend in part on this conception. In short, the pecking order of the academic disciplines might depend, in part, on the development of these conceptions. The greater value placed on abstract reasoning might also make academic subjects that appear to demand this type of intelligence especially threatening to those who doubt their abstract reasoning skills. The development of the concept of ability as capacity means, as we have seen, that the consequences of low perceived ability become more negative. The development of the concept of fluid intelligence might, similarly, have negative consequences for those who believe they are deficient in this aspect of intelligence. It might, thereby, lead to increased avoidance of those

higher status subjects such as mathematics that seem to demand more fluid intelligence.

The development of conceptions of intelligence might also be expressed in student attitudes to different teaching methods. For example, provided they do not doubt their competence, students with conceptions akin to fluid and crystallized intelligence appear more likely than those without these conceptions to endorse Frederickson's case for a greater emphasis in education on fluid intelligence: On "the dynamic physical and social world outside the classroom where finding and solving novel problems is more likely to take place" (1984, p. 199). A level 3b high school student's comment illustrates this point: "The way teachers are, they'd be more impressed with someone who was good with words. They don't pay attention to the way you think, just what you absorb." Younger children gave no hint of such an attitude. Their conceptions of intelligence appear to dispose them to see virtue in memorization. Indeed level two, quiz-show, conceptions of intelligence might contribute to the "conservativeness" that teachers who attempt to encourage self-directed problem finding and solving can encounter from younger students. On the other hand, level 2 conceptions of intelligence might be sustained by the emphasis on memorization and on the following of teachers' rules that apparently prevails in the schools (Goodlad, 1983).

In any event, the emergence of conceptions akin to fluid and crystallized intelligence in late adolescence appears to mean that students can be more critical of schoolwork that emphasizes memorization and mastery of routines at the same time that they will, if they doubt their reasoning ability, become more threatened by schoolwork that obviously involves reasoning rather than memory. This theme seems to be echoed at the social level in the greater prestige awarded activities that involve more abstract reasoning. The

distinction between activities in terms of the amount of abstract reasoning they involve also adds complexity to the social hierarchy. It also offers new sources of interest and competence to those who do not doubt their reasoning ability. But for those who believe themselves deficient in abstract intelligence, the scope for feelings of competence and esteem is narrowed and the need to seek alternative sources of esteem must grow stronger.

Individual Differences in Adolesence

Up to this point I have implied that if we fail to describe individuals in terms of both their conceptions of ability and intelligence (what ability and intelligence mean to them) and the amounts of ability or intelligence they believe they have we will have an incomplete picture of their competence-related self-evaluations. There has been no lack of attention to the amounts of ability students believe they have and to the related question of levels of self-esteem (Dusek & Flaherty, 1981). The first topic, on the other hand, has been almost ignored until recently. When both these dimensions are considered, it will be evident that dramatic changes in the meaning of ability or intelligence need not be accompanied by changes in mean levels of perceived competence or self-esteem. Though low perceived competence may be more "serious" after mature conceptions emerge, this could be obscured in studies of self-esteem across the adolescent years, by the positive correlates of higher perceived ability.

But the picture is yet more complicated.[2] I have, to this point in this paper, implicitly assumed that students always use their most differentiated conceptions of ability. But this is not the case. The likelihood that they will do so is increased by evaluative or test-like conditions (Jagacinski & Nicholls, 1984; Nicholls, 1984). Furthermore, high school students vary in the degree to which they are habitually concerned with establishing that they

are highly capable compared to others--a disposition we have termed ego-orientation. Students can be prone to task orientation instead, in which case their concern is to learn, understand, and make sense of things. Task orientation (and not ego orientation) is associated with satisfaction with school and with plans to attend college (Nicholls, Patashnick, & Nolen, 1985). Furthermore, these relationships hold even when level of perceived ability is partialed out. In short, even if students do not think they are more able than their peers they might find school satisfying and want to continue their education if, instead of being concerned about their capacity, their concern is to learn and to make sense of the world. This, in contrast to ego orientation, seems to be an orientation that allows individuals to gain a sense of competence and accomplishment even if they are below average in capacity. Thus, the extent to which our society emphasizes interpersonal competition and a conception of excellence that means beating others rather than contributing something of value to others' lives might have important consequences for the personal functioning of adolescents and for the level of injustice in our society. In this respect it seems unfortunate that, in general, the emphasis on interpersonal competition increases rather than decreases during adolescence (Eccles, Midgley, & Adler, 1984).

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Table 1 Levels of Differentiation of Ability and Effort

Level 1: Effort or outcome is Ability. Effort, ability, and performance outcomes are imperfectly differentiated as cause and effect. Explanations of outcomes are tautological. Children center on effort (people who try harder than another are seen as smarter even if they get a lower score) or, on outcome (people who get a higher score are said to work harder--even if they do not--and are seen as smarter.

Level 2: Effort is the Cause of Outcomes. Effort and outcome are differentiated as cause and effect. Effort is the prime cause of outcomes: Equal effort is expected to lead to equal outcomes. When attainment is equal but effort differs, this is seen as due to compensatory effort by students who try less (e.g., she/he worked really hard for a while) or misapplied effort by those who try harder (e.g., she/he went quickly and made mistakes).

Level 3: Effort and Ability Partially Differentiated. Effort is not the only cause of outcomes. Explanations of equal outcomes following different effort involve suggestions (e.g., the person trying less is faster or brighter) that imply the conception of ability as capacity. These implications are not, however, systematically followed through. e.g., children may still asset that individuals would achieve equally if they applied equal effort.

Level 4: Ability is Capacity. Ability and effort are clearly differentiated. Ability is conceived as capacity which, if low, may limit or, if high, may increase the effect of effort on performance. Conversely, the effect of effort is constrained by ability. When achievement is equal, lower effort implies higher ability.

Table 2 Conceptions of Verbal and NonVerbal Intelligence

1. Intellectual Skills are Evaluated in terms of their Subjective Difficulty. Verbal and abstract reasoning tasks are distinguished on the basis of how hard they seem for the child or for another person. The intrinsic properties of the different skills are not referred to. Most children judge the verbal test as harder but do not (as do children at Level 2a) claim that this is because words have meanings that must be learned and remembered. Some fluctuate in their choices. The identifying factor, however, is the self-referenced or tautological nature of the explanations for why one skill is harder.

2. The Development of Intelligence Involves Effortful Learning or Acquisition of Information.

a. Verbal but not abstract intelligence is seen to require learning and retention of much information--many specific word meanings. This is seen as dependent on systematic or conscious attempts to learn and (or) on teaching. Abstract stimuli are not seen to have specific meanings that must be learned or remembered: Abstract reasoning can be done with little or no learning, memory, or effort. Thus, abstract intelligence is easier to improve. The implication is that abstract reasoning is not a real or significant form of intelligence.

b. Verbal intelligence and abstract intelligence are not seen as inherently different: Both require systematic efforts to acquire information and can be improved by direct teaching. Each type of intelligence is seen as requiring the same amount of learning and the rate of improvement of each is dependent on amount of effort (and teaching) to the same extent.

c. As in 2b, verbal and abstract intelligence are both seen as dependent on acquisition of information and are not seen as inherently different. Opportunities to acquire them, however, are seen as unequal. There are

dictionaries of words and/or many opportunities to learn words. There are fewer opportunities to learn abstract simuli. Thus, it would be harder to improve abstract reasoning.

3. Information-Acquisition and Problem-Solving are Distinguished.

a. Verbal but not abstract material can be memorized. Words can be memorized because unlike abstract stimuli, they have specific meanings. The latter, lacking meanings, are harder to compare, are more confusing, or require more concentration to enable mental comparisons. Thus abstract intelligence would be harder to improve.

b. Verbal reasoning reflects memory whereas abstract reasoning reflects problem solving ability. Words have specific meanings. They can be learned by memorizing or by a planned effort to learn. Abstract reasoning is more a matter of thinking ability. It involves less memory. It reflects commonsense, creativity, or general experience. Thus (as in 3a) it would be harder to improve abstract intelligence.

Footnotes

[1] One should not confuse meanings or conceptions of ability with the relationships between judgments of ability and effort. A judgment that effort and ability are positively related could, for example, be a statement that brighter students are usually harder workers--as is the case. Students at all levels of conception of ability and effort recognize this. Or, a judgment that higher effort indicates lower ability could reflect the "immature" notion that if a task is "hard for you" you can't be smart at it. The former type of judgment could create the false impression that a student lacks the conception of ability as capacity whereas the latter type of judgment could be wrongly taken as evidence of this conception. In short, evidence of any given relationship between perceived effort and judged ability does not, in itself, provide a sound basis for judging conceptions of ability.

[2] I have not touched the issue of the origins of the conceptions of ability and intelligence. Existing discussions of this topic usually fail to distinguish: 1. The source of meanings or the structure of thought; 2. The determinants of the rate at which these meanings or structures are developed; and 3. The determinants of the usage of these meanings or structures. The distinction between 1 and 2 is that between structuring and stimulating functions (Furth, 1981; Kohlberg, 1969). The third issue is touched on in this section. From an educational perspective, a preoccupation with questions 1 and 2 is, in my view, unlikely to be productive. There is not much point, for example, in seeking to learn how we might slow down the development of conceptions of ability or intelligence. There is more point in understanding how we can place these conceptions within more productive, wider frameworks. This is the problem of acknowledging the sense implicit in these conceptions

without assuming that they provide the only interpretive framework.